

## **Eutrophication of U.S. Freshwaters: Analysis of Potential Economic Damages**

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Human-induced eutrophication degrades freshwater systems worldwide by reducing water quality and altering ecosystem structure and function. We compared current total nitrogen (TN) and phosphorus (TP) concentrations for the U.S. Environmental Protection Agency nutrient ecoregions with estimated reference conditions. In all nutrient ecoregions, current median TN and TP values for rivers and lakes exceeded reference median values. In 12 of 14 ecoregions, over 90% of rivers currently exceed reference median values. We calculated potential annual value losses in recreational water usage, waterfront real estate, spending on recovery of threatened and endangered species, and drinking water. The combined costs were approximately \$2.2 billion annually as a result of eutrophication in U.S. freshwaters. The greatest economic losses were attributed to lakefront property values (\$0.3-2.8 billion per year, although this number was poorly constrained) and recreational use (\$0.37-1.16 billion per year). Our evaluation likely underestimates economic losses incurred from freshwater eutrophication. We document potential costs to identify where restoring natural nutrient regimes can have the greatest economic benefits. Our research exposes gaps in current records (e.g., accounting for frequency of algal blooms and fish kills) and suggests further research is necessary to refine cost estimates.